100001.062102

CLAIMS:

13. A peptide having the amino acid sequence

X01-X02-X03-G-X04-X05-X06-X07-X08-X09-W-X10-X11-X12

wherein

X01 = amino group, acetyl group, biotin group, fluorescent label, spacer, linker or deletion;

X02 = D,G,E,T, S or deletion;

X03 = W,Y,F,G,T;

X04 = T,S,A,G;

X05 = L,F,Y,W;

X06 = V,I,W,F,Y;

X07 = S,A,C;

X08 = G,D,E,N,Q;

X09 = F,L,I,Y;

X10 = E,Q,T,S,L;

X11 = Y,F,T,S,W;

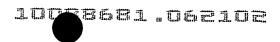
X12 = amide, the free acid, GKK, or a spacer;

and peptides having the amino acid sequence

X01-X02-W-X03-R-X04-X05-X06-X07-X08-E-A-R-X09-X10-X11-X12-X13-X14-X15-X16-X17

wherein

X01 = amino group, amino acid, peptide, acetyl group, biotin group,



fluorescent label, spacer, linker or deletion;

$$X02 = H, E, Q;$$

$$X03 = H, F, Y, W;$$

$$X04 = A, V;$$

$$X05 = G, T, E, S, D, N;$$

$$X06 = S, H, A;$$

$$X07 = D, N, Q, E;$$

$$X08 = G$$
, A, or a deletion;

$$X09 = D, N, R;$$

$$X10 = S, T, C, M;$$

$$X11 = H F, W, Y;$$

$$X12 = A, D, N, S;$$

$$X13 = D, N;$$

$$X14 = E, P;$$

$$X15 = R, K, T;$$

X16 = S, T, C, M or a deletion;

X17 = amide, the free acid, GKK, SGKK or a spacer.

14. The peptide according to claim 13 having the following amino acid sequence:

wherein

X01 = amino group, acetyl group, biotin group, fluorescent label, spacer, linker or deletion;

$$X02 = D_1E_1T_1$$
, or deletion;

$$X03 = W,Y,T;$$

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X04 = T,S;
X05 = L,F;
X06 = V,F;
X07 = S;
X08 = G,D,E;
X09 = F,L;
X10 = E,Q,T,L;
X11 = Y,T,S;
X12 = amid, the free acid, GKK, or a spacer;
and peptides having the amino acid sequence
X01-H-W-X03-R-A-X05-S-D-X08-E-A-R-R-S-Y-X12-D-P-X15-X16-X17
wherein
X01 = amino group, amino acid, peptide, acetyl group, biotin group,
fluorescent label, spacer, linker or deletion;
X03 = Y, W;
X05 = T, E;
X08 = G, or a deletion;
X12 = A, N;
X15 = K, T;
X16 = S, or a deletion;
X17 = amide, the free acid, GKK, SGKK or a spacer.
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15. The peptides according to claim 13 selected from the group consisting of:

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-TGSFFSELWTSR<sup>2</sup>,
EYGSFFSELWTSR<sup>2</sup>,
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1-5-

TYGTLFSDFWLSR², DWGTLVSGFWEYR², DWGTLFSDFWQTR²,

wherein R^2 is an acid amide, a free acid or $GKKR^3$, and wherein R^3 is an acid amide or a free acid;

with the proviso that a maximum of one non-conservative amino acid exchange is effected per amino acid position in the sequence, wherein "non-conservative exchange" means an exchange of amino acids between the groups mentioned below:

Group I: Leu, Ile, Val, Met, His, Trp, Tyr, Phe,

Group II: Glu, Gln, Asp, Asn,

Group III: Ser, Thr, Cys, Gly, Ala, Pro,

Group IV: Lys, Arg;

and

peptides selected from the group consisting of:

HWWRAESD-EARRSYNDPK-R², HWYRATSDGEARRSYADPTSR²,

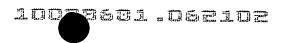
with the proviso that a maximum of two non-conservative amino acid exchanges are effected per amino acid position in the sequence, wherein "non-conservative exchange" means an exchange of amino acids between the groups mentioned below:

Group I: Leu, Ile, Val, Met, His, Trp, Tyr, Phe,

Group II: Glu, Gln, Asp, Asn,

Group III: Ser, Thr, Cys, Gly, Ala, Pro,

Group IV: Lys, Arg.



TYGTLFSDFWLSR², DWGTLVSGFWEYR², DWGTLFSDFWQTR²,

wherein R^2 is an acid amide, a free acid or $GKKR^3$, and wherein R^3 is an acid amide or a free acid;

with the proviso that a maximum of one non-conservative amino acid exchange is effected per amino acid position in the sequence, wherein "non-conservative exchange" means an exchange of amino acids between the groups mentioned below:

Group I: Leu, Ile, Val, Met, His, Trp, Tyr, Phe,

Group II: Glu, Gln, Asp, Asn

Group III: Ser, Thr, Cys, Gly, Ala, Pro,

Group IV: Lys, Arg;

and

peptides selected from the group consisting of:

HWWRAESD-EARRSYNDPK-R², HWYRATSDGEARRSYADPTSR²,

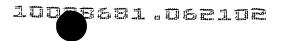
with the proviso that a maximum of two non-conservative amino acid exchanges are effected per amino acid position in the sequence, wherein "non-conservative exchange" means an exchange of amino acids between the groups mentioned below:

Group I: Leu, Ile, Val, Met, His, Trp, Tyr, Phe,

Group II: Glu, Gln, Asp, Asn,

Group III: Ser, Thr, Cys, Gly, Ala, Pro,

Group IV: Lys, Arg.



16. The peptides according to claim 13, characterized by being:

TGSFF SELWT SGKK-amide or free acid,

E YGSFF SELWT SGKK-amide or free acid,

T YGTLF SDFWL SGKK-amide or free acid,

His-Trp-Trp-Arg-Ala-Glu-Ser-Asp-Glu-Ala-Arg-Arg-Ser-Tyr-Asn-Asp-Pro-Lys-amide or free acid,

Ala-Arg-Arg-Cys-Tyr-Asn-Asp-Pro-Lys-amide or free acid,

D WGTLV SGFWE Y amide or free acid,

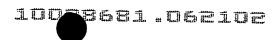
D WGTLF SDFWQ TGKK amide or free acid,

H WYRAT SDGEA RRSYA DPTSG KK-amide or free acid,

HWWRAESDEARRSYNDPKC-amide or free acid,

which may also be acetylated N-terminally.

- 17. The peptides according to claim 13, characterized by being bound by antibodies of patients suffering from dilatative cardiomyopathy.
- 18. The peptides according to claim 13, characterized in that said linker is selected from the group consisting of:
 - α -aminocarboxylic acids and their homo- and heterooligomers;
 - α,ω -aminocarboxylic acids and their branched homo- or heterooligomers;
 - other amino acids and their linear and branched homo- or heterooligomers (peptides);
 - amino-oligoalkoxy-alkylamines;
 - maleinimidocarboxylic acid derivatives;
 - oligomers of alkylamines;
 - 4-alkylphenyl derivatives;
 - 4-oligoalkoxyphenyl or 4-oligoalkoxyphenoxy derivatives;
 - 4-oligoalkylmercaptophenyl or 4-oligoalkylmercaptophenoxy derivatives;



- 4-oligoalkylaminophenyl or 4-oligoalkylaminophenoxy derivatives;
- (oligoalkylbenzyl)phenyl or (4-oligoalkylbenzyl)phenoxy derivatives, and (4-oligoalkoxybenzyl)phenyl or (4-oligoalkoxybenzyl)phenoxy derivatives;
- trityl derivatives;
- benzyloxyaryl or benzyloxyalkyl derivatives;
- xanthene-3-yloxyalkyl derivatives;
- (4-alkylphenyl) or ω -(4-alkylphenoxy)alkanoic acid derivatives;
- oligoalkylphenoxyalkyl or oligoalkoxyphenoxyalkyl derivatives;
- carbamate derivatives;
- amines;
- trialkylsilyl or dialkylalkoxysilyl derivatives;
- alkyl or aryl derivatives;
- and combinations thereof.
- 19. The peptides according to claim 13, characterized by being bound to a solid phase.
- 20. The peptides according to claim 13, characterized by being bound to a solid phase through a spacer.
- 21. A medicament containing the peptides according to claim 13.
- 22. Use of the peptides according to claim 13 for the preparation of a medicament for treatment with diseases related to β_1 -adrenergically active auto-antibodies, especially dilatative cardiomyopathy.
- 23. A method for treating diseases related to β_1 -adrenergically active autoantibodies by removing the auto-antibodies by means of peptides according to claim 18 bound to a solid phase.
- 24. A device for chromatography containing peptides according to claim 18 bound to a solid phase.